Creating a Reliable Lifetime Income

Addressing the Sequence-of-Returns Dilemma through Portfolio Risk Management

Overview

With the baby boomer generation rolling into retirement, financial advisors have been faced with increased demand to assist with retirement income planning. As the financial advisory community struggles to address this demand, advisors are realizing that their traditional planning techniques must improve. In this white paper, we analyze the problem of providing a reliable lifetime income. We compare several approaches and demonstrate that risk management is a key element to a successful investor outcome.

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For decades, financial advisors have been offering tried-and-true advice: stay invested in the market; continue saving and investing in your portfolio across all market conditions; when the market goes down, ride out the storm—eventually growth will return and the damage to a portfolio will be repaired. We believe this advice was completely correct when baby boomers were in their thirties and forties. However, this approach simply does not work for clients nearing retirement or in retirement. When an individual must use a portfolio to meet current income needs, it is not always possible to "ride out the storm."

To solve the retirement income problem, we believe a risk management strategy must be included in clients' portfolios for two main reasons. The first reason is behavioral. During periods of financial crisis, individual investors are inclined to panic. They tend to sell assets after large market declines and move to cash. This hurts long-term returns, as they lock in significant losses. If this were the only problem, financial advisors might be able to address this issue without adopting a risk management strategy. Advisors could focus their efforts on counseling. However, in our opinion, a second reason makes the adoption of a risk management strategy more critical. This is the fact that market declines combine with withdrawals from a portfolio in a truly toxic way. This sequence-of-returns problem mathematically puts portfolios on an inescapable downward trajectory, ultimately resulting in portfolio depletion.

Conversely, the incorporation of a risk management strategy into a portfolio that is used to fund retirement income is likely to actually increase portfolio returns over time, providing investors the potential to draw more reliable lifetime income from their portfolios. By reducing losses during periods of financial turbulence, a portfolio is able to sustain withdrawals and benefit to a larger degree from a market recovery. In this paper, we will provide a clear quantification of this effect.

The approach we will analyze involves combining a portfolio that allocates its largest exposure to stocks and deploys risk management techniques that major financial institutions have used extensively to guard against severe, sustained declines in the market.

Traditionally, fixed income assets have served a dual role in an investor's portfolio. Fixed income is used to generate income and manage risk. In the 1980s and 1990s, this approach was very successful; however, times have changed. With today's low interest rate environment, bonds have not adequately fulfilled income-generating needs. As a risk management tool today, bonds are not only less effective but are also likely to produce adverse and unintended results. When interest rates rise from today's 30-year lows, bonds will likely decline in value. Instead of offsetting stock market declines, they could actually magnify portfolio losses. As Warren Buffett said in his most recent annual report, "Right now bonds should come with a warning label."

By combining a portfolio risk management strategy with equities, the need for fixed income assets is reduced.

In order to quantify the benefits of risk management in addressing the retirement income problem, let's review a detailed analysis of a specific risk management strategy called The Milliman Managed Risk Strategy™. This hedging strategy is used in a variety of funds to help investors weather market turbulence. It is used as a strategy in mutual funds and target-date funds to seek to improve clients' likelihood of meeting retirement income goals. It is also used within variable annuities with guaranteed living benefit riders that are intended to give clients guaranteed lifetime income.

The goal of the Milliman Managed Risk Strategy™ is to stabilize the volatility of a fund around a target level, such as 10%, and to reduce the downside exposure of a fund during periods of significant and sustained market decline. The volatility management process is designed to keep the risk level of a fund from increasing significantly during periods of market turbulence. An additional goal of the volatility management process is to earn additional returns based on the tendency of market volatility to decrease during extended periods of favorable market returns. In an attempt to reduce losses during periods of significant and sustained market decline, the Milliman Managed Risk Strategy™ uses a futures-based risk management process founded on strategies commonly used by major financial institutions. This strategy adjusts futures positions daily, subject to market-based thresholds, in an effort to preserve the capital of a fund on a rolling five-year basis. In a severely declining market, futures gains may be harvested and reinvested in growth assets in an effort to maximize long-term returns.

Exchange-traded futures contracts on major equity indices, U.S. Treasury bonds, and currencies are used to implement the Milliman Managed Risk Strategy™ within a fund. These instruments have been selected based on their high levels of liquidity and the security provided by major exchanges as the counterparty in a hedging transaction. Futures contracts are used only in an effort to reduce risk relative to a long-equity portfolio.

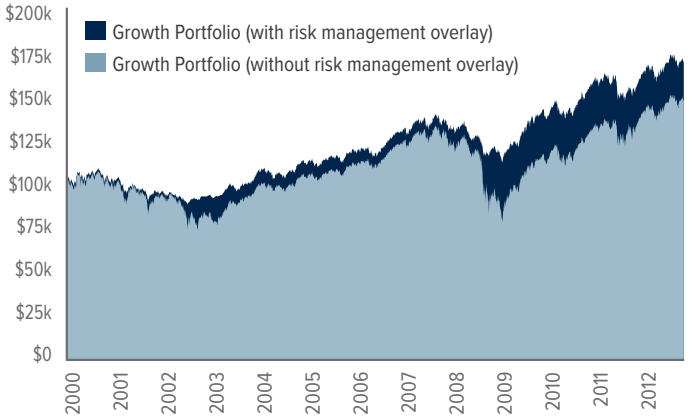
Now that we have defined the specific strategy that we are going to analyze, let's review its performance in helping to produce

sustainable retirement income. As a starting point, let's review a backtest from January 2000 through December 2012 of a growth-oriented portfolio with and without the Milliman Managed Risk Strategy™. Exhibit A illustrates the results.

EXHIBIT A

Milliman Managed Risk Strategy™ Backtest During the 2000s

1/1/00 - 12/31/12



Source: Milliman Financial Risk Management LLC, as of 1/1/00–12/31/12.

The performance data quoted represents hypothetical past performance, is for illustrative purposes and is not intended to represent any actual investments. Current performance may be lower or higher than the performance data quoted above. Investment return and principal value will fluctuate, so that shares, when redeemed, may be worth more or less than their original cost. Past performance is no guarantee of future results.

"Growth-Oriented Portfolio" is defined as a 65% and 35% allocation to the S&P 500 Index and Barclay's U.S. Aggregate Bond Index, respectively. The S&P 500 Index is a commonly used benchmark comprised of all the stocks in the S&P 500 weighted by market value. The Barclay's U.S. Aggregate Bond Index is a universally accepted benchmark for bond performance and is comprised of bonds with a maturity over one year. The index performance shown is for informational purposes only and is not reflective of any investment. It is not possible to invest directly in an index.

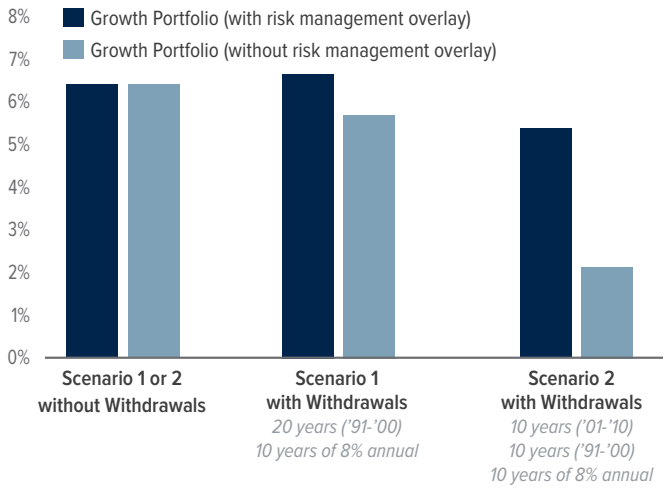
This period contained several events that highlight the value of the Milliman Managed Risk Strategy™. The bursting of the Internet bubble and the associated bear market from 2000 to 2002 resulted in material losses for the portfolio that did not apply the Milliman Managed Risk Strategy™. The portfolio that did apply the hedging strategy, however, retained most of its value. The volatility targeting process of the strategy benefitted the hedged portfolio during the stable, growing markets from 2003 to 2007. This benefit occurs because market volatility is often low during sustained bull markets. This allows the Milliman Managed Risk Strategy™'s volatility management process to increase its net exposure to growth assets. During the global financial crisis in 2008 and 2009, the benefits of the strategy are clear. Both the volatility management process and the capital preservation component kick into high gear to cushion the impact of severe market declines. Over this 10-year period, the portfolio that applied the Milliman Managed Risk Strategy™ is 56% higher than the unhedged portfolio.

While this is interesting, the primary benefit of a risk management strategy in producing reliable retirement income is that it addresses the sequence-of-returns problem. Without a risk management strategy in place, market declines combine with portfolio withdrawals in a negative way. The overall effects of portfolio withdrawals vary in different market environments. This is illustrated below (Exhibit B) via the historical performance of a hypothetical portfolio consisting of 65% equities (represented by the S&P 500 Index), and 35% bonds (represented by the Barclay's U.S. Aggregate Bond Index), reflecting a 5% annual withdrawal. In Scenario 1, the equity markets experience the return sequence of the 1990s first, followed by the 2000s, and finally a hypothetical 10-year period of 8% annual returns.* In Scenario 2, the equity markets experience the return sequence of the 2000s first, follwed by the 1990s, and finally a hypothetical 10-year period of 8% annual returns. We assume that the bond portfolio returns 2% annually.*

EXHIBIT B

Hypothetical Impact of Sequence of Returns & Portfolio Withdrawals

Average annual return, 1992 - 2011.



*2% annual return of the bond portfolio is based on current 10-year Treasury rates.

Source: Milliman Financial Risk Management LLC, as of 1/1/00–12/31/12.

Data shown illustrates the average annual return of a 65/35 stock/bond portfolio from 1992 - 2011, with and without the Milliman Managed Risk Strategy™ overlay.

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The compound annualized growth rate (CAGR) for this portfolio is 6.5% for both Scenarios 1 and 2, since all that has changed is the sequence of equity returns. However, once we reflect a 5% annual withdrawal, an investor's internal rate of return is strongly affected. In Scenario 1, we have the favorable market performance of the 1990s, which easily supports the withdrawals—the investor's internal rate of return (IRR) in this scenario is 5.7%. In Scenario Two, the poor returns from the 2000s, combined with withdrawals, deplete the investor's portfolio. This portfolio is not able to fully benefit from the favorable returns in subsequent periods. The investor's IRR in Scenario 2 is 2.3%. The investor's return is 340 basis points lower per year due to the sequence of returns.

Now let's examine the sequence-of-returns effect on the portfolio with the same average equity exposure using the Milliman Managed Risk Strategy™. In Scenario 1, the investor's IRR is 6.7%. It is higher than the IRR from the unhedged portfolio due to the hedge gains during the 2000s. In Scenario 2, the investor's IRR is 5.6%. The impact of the sequence of returns is dramatically reduced. The impact of the sequence-of-returns effect is reduced by 68% from 340 basis points per year to 110 basis points per year.

By using a portfolio risk management strategy, investors can draw retirement income from a portfolio in a more reliable manner.

After examining these two scenarios, we can understand the sequence-of-returns problem. Now let's look at the impact of the Milliman Managed Risk Strategy™ over 1,000 market scenarios. In this analysis, 30 years of daily returns were generated for 1,000 scenarios for both equities and bonds. The scenarios are generated to satisfy the requirements set out by the American Academy of Actuaries for calculating reserves and capital for life insurers' portfolios. For each scenario of equities and bonds, we determine the returns for a 65% unhedged equity portfolio and the returns for a portfolio that has an average equity exposure of 65% and applies the Milliman Managed Risk Strategy™. Exhibit C summarizes the distribution of returns for the two portfolios.

The table above shows the hypothetical distribution of returns over a 1-year horizon with no deposits or withdrawals in the investor's portfolio. The hedging strategy has reduced the impact of down-markets by about two-thirds. During strong bull markets, the hedging strategy will reduce portfolio returns. Annual volatility in the hedged portfolio is 45% lower at 10.8% versus 19.6%.

EXHIBIT C

ANNUAL RETURN DISTRIBUTIONS

Stochastic Analysis

Percentile	Unhedged Return	Unhedged Volatility	Hedged Return	Hedged Volatility
1%	-65.8%	35.9%	-18.6%	13.5%
5%	-31.5%	30.2%	-11.4%	12.9%
10%	-17.2%	26.8%	-7.5%	12.4%
25%	0.0%	22.4%	-0.3%	11.5%
50%	11.6%	18.9%	7.1%	10.8%
75%	19.6%	15.6%	15.0%	10.0%
90%	25.2%	13.4%	20.7%	9.3%
95%	29.0%	12.0%	23.6%	8.9%
99%	37.8%	9.7%	28.7%	8.2%
Average	6.9%	19.6%	**6.8%**	**10.8%**

Source: Milliman Financial Risk Management LLC, 2012.

A stochastic analysis is a mathematical process used to model systems that behave randomly. The analysis above illustrates the impact of the Milliman Managed Risk Strategy™ on over 1,000 random market scenarios, calculated in accordance with standard actuarial process.

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Clearly the hedged portfolio has favorable characteristics. However, Exhibit C does not capture the investor experience for someone going through retirement. To achieve this, we must reflect ongoing annual withdrawals over a retirement timescale. In Exhibit D, we establish a portfolio at age 60 and withdraw 5% of the portfolio value at age 65 for the next 25 years. For each of the 1,000 scenarios, we calculate the internal rate of return.

Since these returns are calculated over a 30-year period, the range from the smallest to the largest value is compressed versus the 1-year horizon analysis. The hedging strategy nearly eliminates negative returns in the lower percentiles of the distribution. However, the more important result of this analysis is the impact of the hedging strategy on the average return. The average return from the hedged portfolio is 6.5% versus an average return from the unhedged portfolio of 5.9%. The average return from the protected portfolio is 60 basis points per year higher, due to the managed risk strategy's beneficial effect in addressing the sequence-of-returns problem.

EXHIBIT D

INTERNAL RATE OF RETURN ANALYSIS

Invest at Age 60, 5% Withdrawal from Age 65 to 90

Percentile	Unhedged	Hedged
1%	-5.9%	-0.1%
5%	-1.3%	1.7%
10%	1.1%	3.0%
15%	2.4%	3.7%
20%	3.4%	4.2%
25%	4.1%	4.8%
50%	6.6%	6.5%
75%	8.4%	8.3%
90%	9.9%	9.9%
95%	10.9%	10.9%
99%	12.6%	12.5%
Average	5.9%	**6.5%**
Standard Deviation	3.8%	**2.7%**

Source: Milliman Financial Risk Management LLC, 2012.

A stochastic analysis is a mathematical process used to model systems that behave randomly. The analysis above illustrates the impact of the Milliman Managed Risk Strategy™ on over 1,000 random market scenarios, calculated in accordance with standard actuarial process. Internal rate of return is the annualized effective compounded return rate. Standard deviation is a measure of historical volatility (annualized).

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This analysis has shown that risk management is an important tool in providing reliable retirement income. Market declines combined with withdrawals can deplete investors' portfolios. This sequence-of-returns risk cannot be effectively addressed with static equity/bond portfolios in today's low interest rate environment. Including a hedging strategy in an investor's portfolio is an excellent choice to address the sequence-of-returns problem. In fact, this approach allows investors to use the same risk management techniques that major financial institutions have been successfully using for years.

ABOUT MILLIMAN FINANCIAL RISK MANAGEMENT LLC

Milliman Financial Risk Management LLC is a global leader in financial risk management to the retirement savings industry. Established in 1998, the practice includes over 100 professionals operating from three trading platforms around the world (Chicago, London, and Sydney), and advises over $80 billion in assets (as of September 30, 2013).

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